EFFECT OF BACKGROUND FREQUENCY OF OCCURENCE ON DIFFICULTY OF VERBAL DISCRIMINATION TASK

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THESIS

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Effect of Background Frequency of Occurrence on Difficulty of Verbal Discrimination Task

by

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ABSTRACT

One list of 16 verbal discrimination (VD) pairs was composed. Pairs were heterogeneous with respect to background frequency of occurrence of the words. Half the pairs were constructed of similar words and half, dissimilar. Correct responses for three groups of subjects were high-frequency words correct, low-frequency words correct, and half high-frequency and half low-frequency words correct. Analysis showed that learning the latter list was significantly more difficult than learning the high frequency correct or low frequency correct lists. Results of the experiment were consistent with that which would have been predicted by the frequency theory of VD learning, or the use of contingent uncertainty from information theory.

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I. INTRODUCTION

Frequency theory of verbal discrimination learning (Ekstrand, Wallace, and Underwood 1966) suggests that the difference in frequency of occurrence between the correct and incorrect response developed during an experiment acts as a cue upon which discrimination is based (Kausler and Farzanegan, 1969). Attneave (1953) has shown that a significant correlation exists between the frequency of occurrence of letters and a subject's judgment of their frequency of occurrence. Considering the frequency theory in conjunction with Attneave's experiment, preexperimental word frequency differentials may be considered as a variable in intra-item discrimination.

To facilitate exposition, the letters H and L will be used to designate the high and low preexperimental frequency of words. The first-second sequencing of these symbols indicates the preexperimental frequency of right and wrong words, respectively. Therefore, HL indicates a verbal discrimination pair wherein the high frequency word is the correct response. The symbol LH indicates the converse. The symbol LH-HL indicates a pair wherein the probability that the high frequency word is correct is equal to the probability that the low frequency word is correct. Verbal discrimination lists composed of HL pairs are termed HL lists, etc.

[illegible]

Either frequency theory or information theory may be utilized to explain the relative difficulty of learning HL, LH, or LH-HL lists. Both theories assume that the subject is capable of discerning the intra-item frequency differential. Frequency theory indicates that an HL list is the simplest since rule 1, the more efficient according to Ekstrand, Wallace and Underwood (1966) applies. Rule 1 states "Select the word with the highest frequency of occurrence." Rule 2 applies to the LH list. This rule states "Select the most frequently occurring word and respond with the other word." In the case of the LH-HL list neither Rule 1 nor Rule 2 applies, and the subject must resort to rote learning.

Information theory provides a means of expressing the additional stimulus yielded by the manner in which an experimenter selects the correct responses of heterogeneous items within a verbal discrimination list. Contingent uncertainty, $U(x:y)$, is defined by Garner (1962) as the extent to which the uncertainty has been reduced by the correlation between random variables X and Y. Therefore,

$$U(x:y) = U_{max}(x,y) - U(x,y)$$

where $U_{max}(x,y)$ is the uncertainty which would be obtained if there were no correlation between X and Y and $U(x,y)$ is the actual uncertainty that exists between X and Y. Uncertainty in the univariate case is

defined as

$$U(x) = -\sum_{i=1}^{n} p(x_i) \log_2 p(x_i)$$

and in the bivariate case

$$U(x,y) = -\sum_{i=1}^{n} \sum_{j=1}^{m} p(x_i, y_j) \log_2 p(x_i, y_j)$$

where $p(x_i)$ and $p(x_i, y_j)$ are the probabilities of occurrence of event x_i or the joint occurrence of x_i and y_j, respectively.

In the case of the HL and LH lists the contingent uncertainty equals the original uncertainty about the correctness of selecting the high or low frequency word and therefore indicates all uncertainty about the correct answer may be removed after the first trial. In the case of the LH-HL list $U_{max}(x,y)$ will equal $U(x,y)$ indicating the subject cannot use the frequency differential to reduce his uncertainty about the correct answer.

Figures 1 through 4 represent joint probability matrices from which $U_{max}(x,y)$ and $U(x,y)$ may be determined, assuming the subject's choices of high and low frequency words are equally likely. By use of the bivariate uncertainty formula and the joint probabilities contained in Figure 1, $U_{max}(x,y)$ may be calculated

$$\begin{aligned} U_{max}(x,y) &= -\sum_{i=1}^{2}\sum_{j=1}^{2} p(x_i, y_j) \log_2 p(x_i, y_j) \\ &= -4(.25 \log_2 .25) \\ &= -\log_2 .25 = \log_2 4 = 2 \text{ bits} \end{aligned}$$

In a similar manner U(x,y) for the HL, LH and LH-HL lists may be computed and established equal to 1, 1 and 2 bits respectively.

FIGURE 1.

Joint Probability of Frequency Quality and
Correct Responses for the Zero Correlation Case

		X		
		High Freq. Words	Low Freq. Words	P(y)
Y	Correct Response	.25	.25	.5
	Incorrect Response	.25	.25	.5
	P(x)	.5	.5	1.0

FIGURE 2.

Joint Probability of Frequency Quality and
Correct Response in the Case of the HL List

		X		
		High Freq. Words	Low Freq. Words	P(y)
Y	Correct Response	.5	0	.5
	Incorrect Response	0	.5	.5
	P(x)	.5	.5	1.0

FIGURE 3.

Joint Probability of Frequency Quality and Correct Response in the Case of the LH List

		X		
		High Freq. Words	Low Freq. Words	P(y)
Y	Correct Response	0	.5	.5
	Incorrect Response	.5	0	.5
	P(x)	.5	.5	1.0

FIGURE 4.

Joint Probability of Frequency Quality and Correct Response in the Case of the LH-HL List

		X		
		High Freq. Words	Low Freq. Words	P(y)
Y	Correct Response	.25	.25	.5
	Incorrect Response	.25	.25	.5
	P(x)	.5	.5	1.0

Therefore the contingent uncertainty, U(x:y), with respect to the HL and LH lists equals 1 bit. This is by definition the amount of uncertainty reduction the subject may attain by using the frequency differential stimulus. Since the original average uncertainty about the correct response was 1 bit, the subject may reduce his average uncertainty to zero on completion of the first trial through the use of

the frequency differential stimulus. In the case of the LH-HL list, the contingent uncertainty equals zero since $U_{max}(x,y)$ equals $U(x,y)$. Therefore, the subject cannot reduce the original average uncertainty by use of frequency differential as a stimulus.

Using the foregoing notions, this study will examine the learning of verbal discrimination lists of the types HL, LH, and LH-HL.

II. METHOD

A. WORD LISTS

One master word list of 16 discrimination items was constructed. These words were selected from categories having at least a .9 correlation over test subjects in the category norms for verbal items compiled by Battig and Montague (1969). An intrapair similarity was established by selecting the words of an item from a single category. Eight discrimination items were composed in this manner. The remaining 8 items were selected such that elements of the items were contained in different categories. Each pair formed contained one high and one low response frequency word as indicated by the Battig and Montague norms. In addition, the frequency of occurrence of the word in written material was examined using the Thorndike and Lorge (1944) general count. In this respect, high response frequency words were required to be members of the AA to A group and low frequency response words members of the 1 to 20 group. This reduced the effect of written and spoken word frequency differences. The master list is shown in Figure 5.

Correct responses for the HL and LH lists were automatically established by the relative frequency of the word pairs. The correct responses for the LH-HL condition are shown in Figure 6. Four

random arrangements of the master list were constructed to reduce cues by position.

FIGURE 5.

Master List

Word List for LH and HL Treatments

High Frequency Word	Low Frequency Word	High Frequency Word	Low Frequency Word
Door	Swan	Roof	Zinc
Book	Fog	Shoe	Cab
Hill	Gorge*	Dog	Skunk*
Salt	Herb*	Glass	Prune
Nail	Wedge*	Milk	Niece
Coat	Scarf*	Word	Jerk
House	Cough	Red	Beige*
Fly	Tick*	Leg	Lung*

* Denotes similar word pairs.

FIGURE 6.

Word List for LH-HL Treatment

List 1 **

Correct Response	Wrong Response	Correct Response	Wrong Response
Door	Swan	Roof	Zinc
Book	Fog	Cab	Shoe
Gorge	Hill	Dog	Skunk
Herb	Salt	Glass	Prune
Wedge	Nail	Niece	Milk
Scarf	Coat	Jerk	Word
House	Cough	Beige	Red
Fly	Tick	Leg	Lung

** List 2 was composed by making the incorrect response of List 1 the correct response in List 2.

B. DESIGN

Each discrimination item was considered to be a 1 x 2 matrix having a uniform probability for the first selection. All responses were recorded. The basic experiment conformed to a completely randomized design with subjects assigned randomly to the three treatments (HL, LH, and HL-LH) and trials to criterion the variable measured. To evaluate changes in performance of subjects over trials, the experiment conformed to a three factor, mixed design with repeated measures on two factors (similarity and trials).

C. SUBJECTS

The 48 subjects were graduate level students in the operations research curriculum at the U.S. Naval Postgraduate School. The subjects were volunteers and were randomly assigned to the three treatment groups.

D. PROCEDURES

Following an explanation of the subject's task and procedures, subjects were tested individually using a Lafayette high-speed memory drum. The discrimination item was presented for a presentation time of 2 seconds followed by a 2 second interitem interval. The declaration was reinforced with the verbal response "correct" from the experimenter when the right word was chosen; otherwise, there was no response. There were no inter-trial breaks. Word choices were recorded for a minimum of six

trials or until a subject performed two successive perfect trials.

Starting lists were randomly selected.

III. RESULTS

The first result to be shown is that the initial choice between high and low frequency words in an item is equally likely and that the maximum uncertainty is equal to 2 bits for any of the three conditions. It will also be shown that the contingent uncertainty for the LH-HL list is zero. Finally the trials to criteria and the learning trend over the first six trials will be analyzed. Table I. shows the high frequency and low frequency word choices on the first trial for all treatments and the chi-square test statistics testing the null hypothesis that choices between high and low frequency words are equally likely. The null hypothesis was not rejected. With this established, the contingent uncertainties previously calculated are confirmed.

TABLE I.

Chi-Square Analysis of High and Low Frequency Responses from the Three Treatments

Treatment	Sample Size	Number of High Freq. Responses	Number of Low Freq. Responses	Chi-Square Statistics	d.f.	Critical Value at p=.05
HL	256	135	121	.382	1	3.84
LH	256	139	117	.945	1	3.84
LH-HL	256	149	113	1.71	1	3.84
Pooled X				3.037	3	7.81
Total	768	417	351	2.84	1	3.84
Differences				.197	2	5.99

Table II. displays the Chi-Square test statistics testing the null hypothesis that the probability of selecting a correct response equals 0.5. The null hypothesis is not rejected. This indicates that the manner in which the correct responses were selected does not give any significant advantage of selecting the correct answer on the first trial to any group.

TABLE II.

Chi-Square Analysis of Correct and Incorrect Responses for the Three Treatments

Treatment	Sample Size	Number of Correct Responses	Number of Incorrect Responses	Chi-Square Statistics	d.f.	Critical Value at p=.05
HL	256	135	121	.382	1	3.84
LH	256	117	139	.945	1	3.84
LH-HL	256	117	139	.945	1	3.84
Pooled X^2				2.272	3	7.81
Total	768	371	397	.44	1	3.84
Difference				1.832	2	5.99

The percent of correct responses per trial for the first six trials by treatment is shown in Table III. Figure 7 is a graphic presentation of these data.

TABLE III.

Percent of Correct Responses Per Trial by Treatment

TREATMENT

Trial	HL	LH	LH-HL
1	52.3	45.7	45.7
2	69.9	63.2	59.4
3	80.9	67.9	64.5
4	87.1	87.5	69.1
5	93.8	89.4	75.8
6	96.8	91.7	79.3

Table IV. reveals the percent of correct responses over the first six trials for similar and dissimilar words by treatment.

TABLE IV.

Percent of Correct Responses for Similar and Dissimilar Words by Treatment

TREATMENT

Trial	HL		LH		LH-HL	
	Sim	Dis	Sim	Dis	Sim	Dis
1	49.2	54.7	48.4	43.0	49.2	41.2
2	71.9	68.8	63.3	64.1	56.3	62.5
3	81.3	80.5	68.8	76.6	64.8	64.1
4	88.3	85.9	85.9	88.3	67.2	71.1
5	94.5	93.0	87.5	91.4	74.3	77.3
6	97.7	95.3	93.8	89.9	78.1	80.5

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[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]		[illegible]	
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	
[illegible]		[illegible]	
[illegible]		[illegible]	

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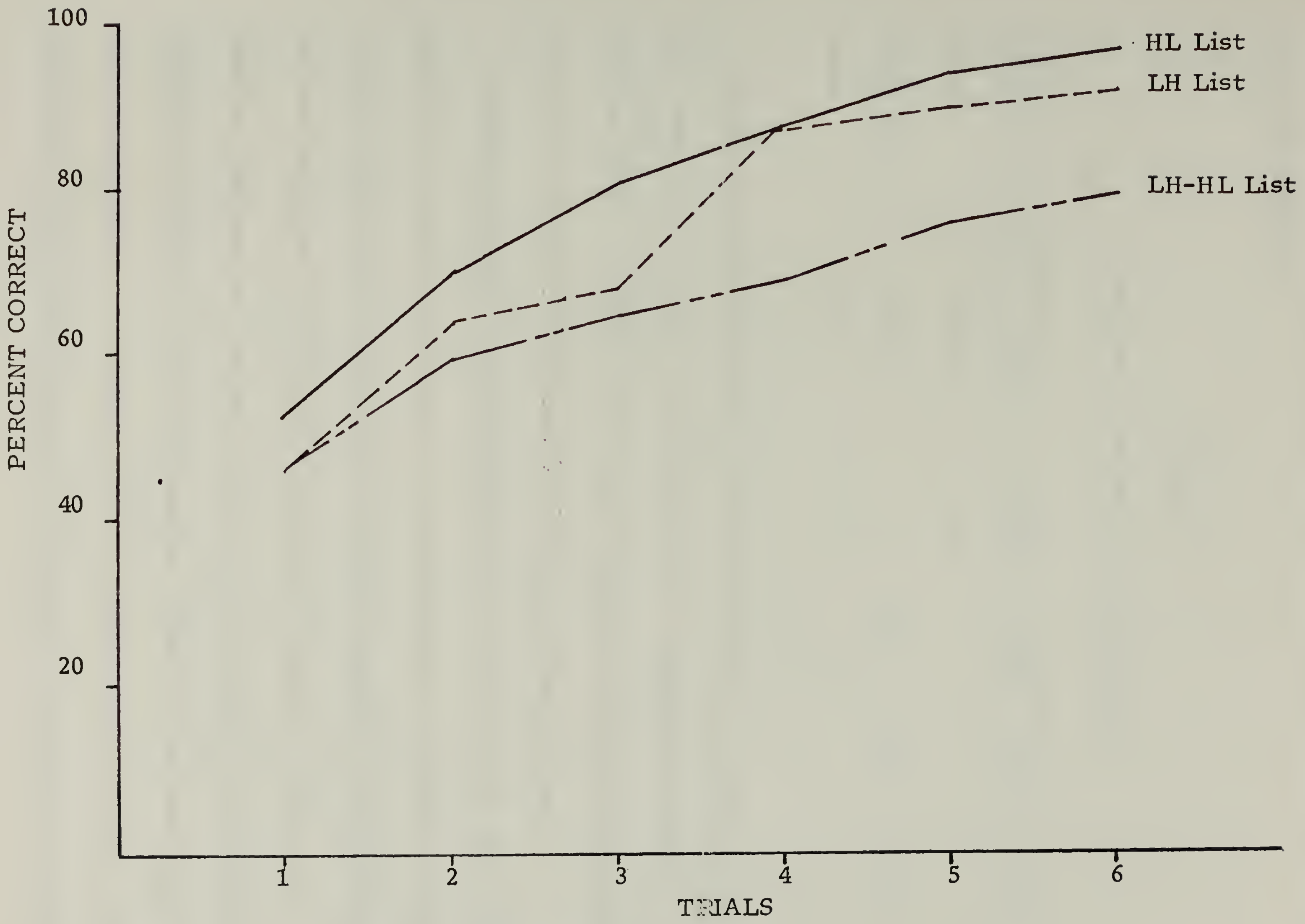

Figure 7. Percent Correct Responses By Treatment

The data were analyzed first using an analysis of variance over the treatments using trials to criterion as the measured variable. Results are shown in Table V.

TABLE V.

Analysis of Variance Over Treatments

Source	SS	df	MS	F	P
Total	717.3	47			
Word List	386.0	2	193.0	26.25	$<.001$
Error	331.3	45	7.35		

The mean number of trials to criterion for the HL, LH and LH-HL lists were 7.36, 7.98 and 13.61 respectively. Application of Tukey's HSD test (TS=3.1) indicated the means of the HL and LH lists equal and the mean of the LH-HL significantly different at the .01 level.

In order to analyze the trend effects across trials and the effect of similarity an analysis of variance was conducted using repeated measures. The basic datum used was the ratio of correct responses to total responses per trial calculated separately for similar and dissimilar word pairs. Based on Underwood and Freund's (1970) work, six trials were considered sufficient to observe trends in the results. Since the data were ratios, the transformation $X = 2 \text{ ARCSIN} \sqrt{\text{ratio}}$, as recommended by Kirk (1968), was utilized. Within this analysis, word lists were considered a between

subjects effect. Similarity and trials effects were considered within subjects effects. Results of this analysis are contained in Table VI. As would be expected, the effects of word lists and trials were significant. Also, the analysis shows the word lists were learned at different rates. This is evidenced by the fact that the list by trials interaction was significant at the .05 level. The effect of similarity proved to be insignificant. The F statistic in this case seems extremely low. However, an F statistic of the value shown or smaller has a P value between .2 and .25.

TABLE VI

Analysis of Variance Over Trials

Source	SS	df	MS	F	P
Total	136.8406	575			
Between Subjects	29.3738	47			
Word List A	9.8872	2	4.9436	11.77	$<.005$
Error	19.4861	45	.4236		
Within Subjects	107.4673	528			
Similarity B	.0054	1	.0054	.0403	n.s.
Trials C	56.8074	5	11.3614	87.75	$<.001$
AXB	.0483	2	.02415	.1839	n.s.
AXC	2.4475	10	.2447	1.89	$<.05$
BXC	.0181	5	.0362	.674	n.s.
AXBXC	.5723	10	.05723	1.009	n.s.
Error 1	5.9214	45	.1316		
Error 2	29.1389	225	.1295		
Error 3	12.5081	225	.0564		

IV. DISCUSSION

This experiment has demonstrated that preexperimental frequency of words may be used in a facilitative manner during a verbal discrimination task. This result is consistent with that predicted by an extension of the frequency theory (Ekstrand, Wallace, and Underwood, 1966) and that predicted by information theory. It should be noted that both of these theories require that the subject be able to discern the relative frequency difference in each item. If this is not possible the subject must resort to strict rote memory and develop the differential frequency cue during the experiment.

In the case of the HL and LH lists, Rules 1 and 2 of frequency theory provide a menas of performing intrapair discrimination with Rule 1 being regarded as the more efficient. The significant list by trials interaction and the curves of Figure 7 suggest the rules were effective in this case. The percent correct curve of the HL treatment is typical of a negatively accelerated, rising learning curve. The curve for the LH group indicates an unevenness that suggests that the dominant tendency (Rule 1) must be suppressed before Rule 2 becomes effective. The LH curve does not indicate that the experimental frequency differential interferred with the use of preexperimental frequency differential as a cue for discrimination.

The experiment did not indicate a significant effect due to similarity of words in an item. This is most likely the result of the dominance of the intrapair frequency variable.

Subjects were not informed of the high correlation or lack of correlation of correct response to background frequency prior to the experiment. Upon completion of the experiment no subject stated that the frequency difference had been noted. However, the results indicate that the stimulus provided was used to facilitate learning.

Unlike the findings of Kausler and Farzanegan (1969), who did not examine the effects of list on first trial choices, this experiment shows that the probability of selecting a correct answer on the first trial is not significantly different for each of the treatments. Combining this finding with the statistically different rates of learning across trials for the treatments leads to more conclusive support that the frequency differential provides a dominant cue in verbal discrimination tasks.

Contingent uncertainty may be used to advantage in that it provides a quantitative measure of the correlation of the stimulus, background frequency in this case, with the correct response. Since a dominant stimulus in the verbal discrimination task may be the differential frequency cue, contingent uncertainty relates the difficulty of the verbal discrimination of heterogeneous items to their preexperimental differential frequencies.

Considering that the application of frequency theory or contingent uncertainty presupposes the subject's ability to differentiate with respect to relative background frequencies, a fruitful area for future research would be to study the threshold for such differences.

V. SUMMARY

One list of 16 verbal discrimination (VD) pairs was composed. Pairs were heterogeneous with respect to background frequency of occurrence of the words. Half the pairs were constructed of similar words and half, dissimilar. Correct responses for three groups of subjects were high-frequency words correct, low-frequency words correct, and half high-frequency and half low-frequency words correct. Analysis showed that learning the latter list was significantly more difficult than learning the high frequency correct or low frequency correct lists. Results of the experiment were consistent with that which would have been predicted by the frequency theory of VD learning, or the use of contingent uncertainty from information theory.

APPENDIX A

SUBJECT'S INSTRUCTIONS

You are participating in a verbal discrimination experiment. You will be shown a list of two word items, one word of which has been arbitrarily selected as correct. The list is 16 items long and will be repeated in various orders. It is your task to view the words and learn which one is correct. Once you have selected your word, announce it to the experimenter. You will have 2.0 seconds to view the words and 2.0 seconds to make your response. If your response is correct the experimenter will tell you that you are correct, otherwise no answer will be given your response. In each item, the correct response word will remain the same throughout the experiment. Trials will continue until a criterion of 2 successive perfect trials is achieved or through six trials, whichever is greater.

Do you have any questions?

APPENDIX B

CORRECT RESPONSES PER SUBJECT OVER TRIALS

LH LIST

Trials

Subjects	1	2	3	4	5	6	7	8	9	10	11	12
1	4	10	13	15	16	16						
2	9	14	15	15	16	16						
3	7	12	16	15	16	16						
4	7	12	14	16	16	16						
5	8	8	8	11	14	14	14	16	16			
6	2	10	10	14	14	15	14	15	16	16		
7	9	12	9	14	13	14	14	13	15	15	16	16
8	8	10	10	16	16	15						
9	6	12	14	16	15	16	16					
10	10	7	11	15	16	16						
11	5	12	12	15	15	14	16	16				
12	8	11	12	12	12	12	14	16	16			
13	7	12	12	13	14	15	15	15	16	16		
14	8	8	14	15	16	16						
15	11	4	9	8	9	11	13	14	15	16	16	
16	8	9	9	13	11	13	14	16	15	16	16	

HL LIST

Trials

Subjects	1	2	3	4	5	6	7	8	9	10	11	12
1	9	7	10	13	14	14	15	14	14	16	16	
2	10	12	13	13	14	15	15	16	16			
3	9	12	15	14	15	15	15	15	16	16		
4	7	8	10	14	16	15	16	16				
5	3	11	9	13	14	16	15	16	16			
6	6	8	13	13	15	16	16	16				
7	11	14	15	16	15	16	16					
8	6	13	16	15	16	16						
9	9	12	14	15	16	16						
10	11	14	14	16	16	16						
11	11	14	16	16	16	16						
12	11	12	15	13	15	16	16					
13	6	15	16	16	16	16						
14	9	10	12	15	14	15	15	16	16			
15	9	10	12	12	15	15	16	16				
16	6	8	7	9	13	14	16	16				

LH-HL LIST

Subjects	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	7	9	10	13	13	15	14	15	14	14	14	14	14	14	16	16						
2	6	12	9	9	10	10	13	13	10	10	13	14	15	15	16	16						
3	6	12	12	13	15	15	15	16	16													
4	4	7	11	13	12	14	12	15	14	15	16	16										
5	10	12	14	12	13	14	15	16	16													
6	11	8	10	8	11	14	15	14	16	16												
7	7	5	10	8	11	11	11	11	11	12	14	13	14	14	14	15	16	16				
8	11	13	10	14	13	14	15	14	15	16	16											
9	9	8	10	8	11	11	8	11	9	11	12	12	13	14	14	14	14	14	14	15	16	16
10	5	10	8	10	11	11	14	14	12	14	16	16										
11	8	9	10	14	11	11	13	15	14	15	15	15	16	16								
12	7	12	12	10	12	14	13	15	15	16	16											
13	6	11	9	11	12	14	15	15	14	15	16	16										
14	7	9	11	10	13	11	12	13	14	15	14	15	16	16								
15	8	7	10	12	14	12	13	12	14	15	14	13	15	16	16							
16	5	8	9	11	12	12	14	13	13	14	15	15	14	15	15	16	16					

APPENDIX C

CORRECT RESPONSE OVER TRIALS BY SIMILARITY ATTRIBUTE

LH LIST

Similar Trials						Dissimilar Trials					
1	2	3	4	5	6	1	2	3	4	5	6
3	5	4	5	4	6	5	4	5	8	7	7
6	3	2	5	3	7	5	1	7	3	6	4
3	5	8	8	8	8	5	3	6	7	8	8
4	6	5	6	8	7	3	6	7	7	6	8
4	4	6	6	5	6	4	7	6	6	7	6
3	6	7	7	7	8	2	6	5	8	8	6
6	2	4	7	8	8	4	5	7	8	8	8
3	5	7	8	8	8	3	7	7	8	7	8
5	6	5	8	8	8	3	4	5	8	8	7
4	5	3	7	7	7	5	7	6	7	6	7
1	6	4	7	8	8	1	4	6	7	6	7
6	3	4	6	6	7	2	5	2	5	8	7
4	7	7	8	8	8	3	5	7	8	8	8
4	5	8	7	8	8	3	7	8	8	8	8
5	7	7	7	8	8	4	7	8	8	8	8
1	6	7	8	8	8	3	4	6	7	8	8

HL LIST

Similar Trials

1	2	3	4	5	6
2	4	5	5	6	8
4	5	4	5	7	7
4	5	8	8	8	8
3	8	8	8	8	8
5	6	7	7	8	8
3	6	8	8	8	8
5	7	8	8	8	8
4	7	7	8	8	8
2	6	8	7	8	8
5	8	8	8	8	8
2	3	5	6	7	8
2	6	4	7	7	8
5	3	6	8	8	8
6	7	7	7	8	7
6	7	7	6	7	7
5	4	4	7	7	8

Dissimilar Trials

1	2	3	4	5	6
4	4	2	4	7	6
5	5	8	7	8	8
5	5	4	7	6	7
3	7	8	8	8	8
6	6	8	6	7	8
8	8	8	8	8	8
6	7	6	8	8	8
5	5	7	7	8	8
4	7	8	8	8	8
7	8	6	6	7	8
4	5	8	7	8	8
1	5	5	6	8	8
2	5	4	6	8	7
3	5	8	7	7	8
4	5	6	7	7	8
4	3	6	6	7	6

LH-HL LIST

Similar Trials						Dissimilar Trials					
1	2	3	4	5	6	1	2	3	4	5	6
4	5	5	6	6	7	2	6	4	6	6	7
4	7	6	5	7	8	3	5	6	5	5	6
3	4	7	6	6	5	5	5	3	8	5	6
4	7	4	5	6	6	1	3	4	5	5	5
5	3	5	3	6	4	4	5	5	5	5	7
5	7	4	7	7	8	6	6	6	7	6	6
2	2	5	6	6	7	5	3	5	2	5	4
6	4	7	5	5	7	5	4	3	3	6	7
3	2	5	6	5	7	1	5	6	7	7	7
4	7	7	6	8	8	2	5	5	7	7	7
4	4	4	3	4	5	2	8	5	6	6	5
4	3	5	7	6	7	3	6	5	6	7	8
5	5	6	4	5	6	5	7	8	8	8	8
4	5	5	5	6	5	3	4	6	5	7	6
3	4	5	7	7	5	5	3	5	5	7	7
3	3	3	5	5	5	2	5	6	6	7	7

APPENDIX D

NUMBER OF RESPONSES BY WORD AND LIST ON FIRST TRIAL

WORD	HL	LH	LH-HL
Door	12	12	9
Swan	4	4	7
Fog	7	6	6
Book	9	10	10
Gorge	8	8	8
Hill	8	8	8
Herb	8	7	7
Salt	8	9	9
Nail	8	9	9
Wedge	8	7	7
Scarf	10	9	8
Coat	6	7	8
Cough	8	9	9
House	8	7	7
Fly	9	10	10
Tick	7	6	6
Zinc	10	7	6
Roof	6	9	10
Cab	6	9	8
Shoe	10	7	8
Dog	7	6	8
Skunk	9	10	8
Prune	7	8	9
Glass	9	8	7
Milk	10	11	9
Niece	6	5	7
Word	9	8	10
Jerk	7	8	6
Beige	6	8	4
Red	10	8	12
Leg	10	9	9
Lung	6	7	7

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13. ABSTRACT

One list of 16 verbal discrimination (VD) pairs was composed. Pairs were heterogeneous with respect to background frequency of occurrence of the words. Half the pairs were constructed of similar words and half, dissimilar. Correct responses for three groups of subjects were high-frequency words correct, low-frequency words correct, and half high-frequency and half low-frequency words correct. Analysis showed that learning the latter list was significantly more difficult than learning the high frequency correct or low frequency correct lists. Results of the experiment were consistent with that which would have been predicted by the frequency theory of VD learning, or the use of contingent uncertainty from information theory.

KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Verbal discrimination learning						
Information theory						
Human learning						
Rote learning						

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rence on difficulty
of verbal discrimina-
tion task.